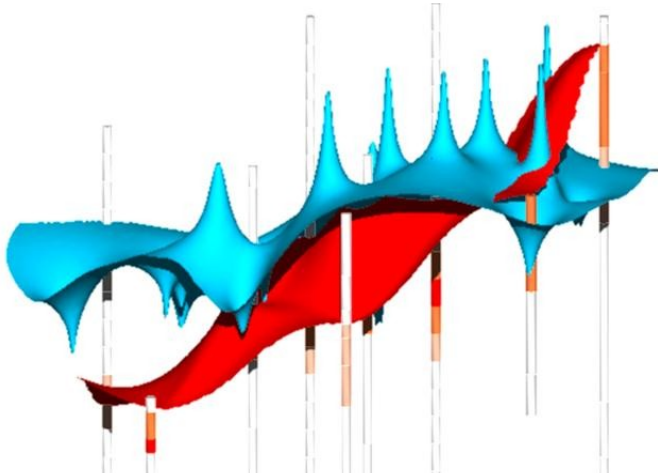
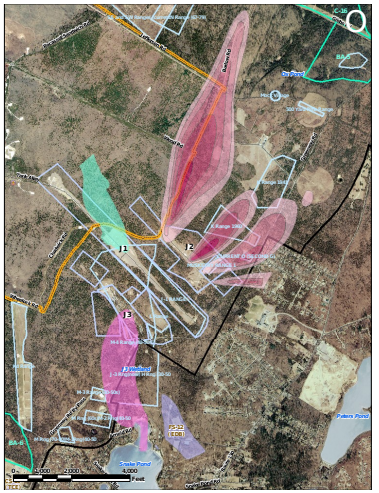
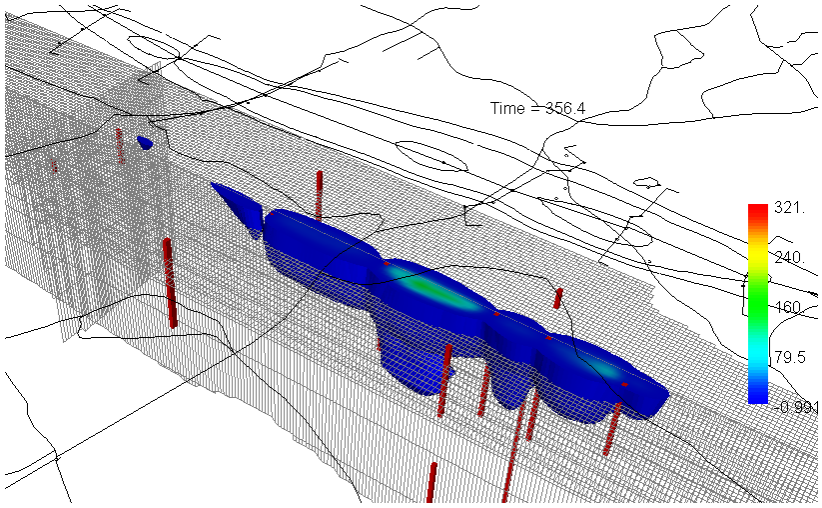
Groundwater Modeling

US Army Corps of Engineers
Philadelphia Distric

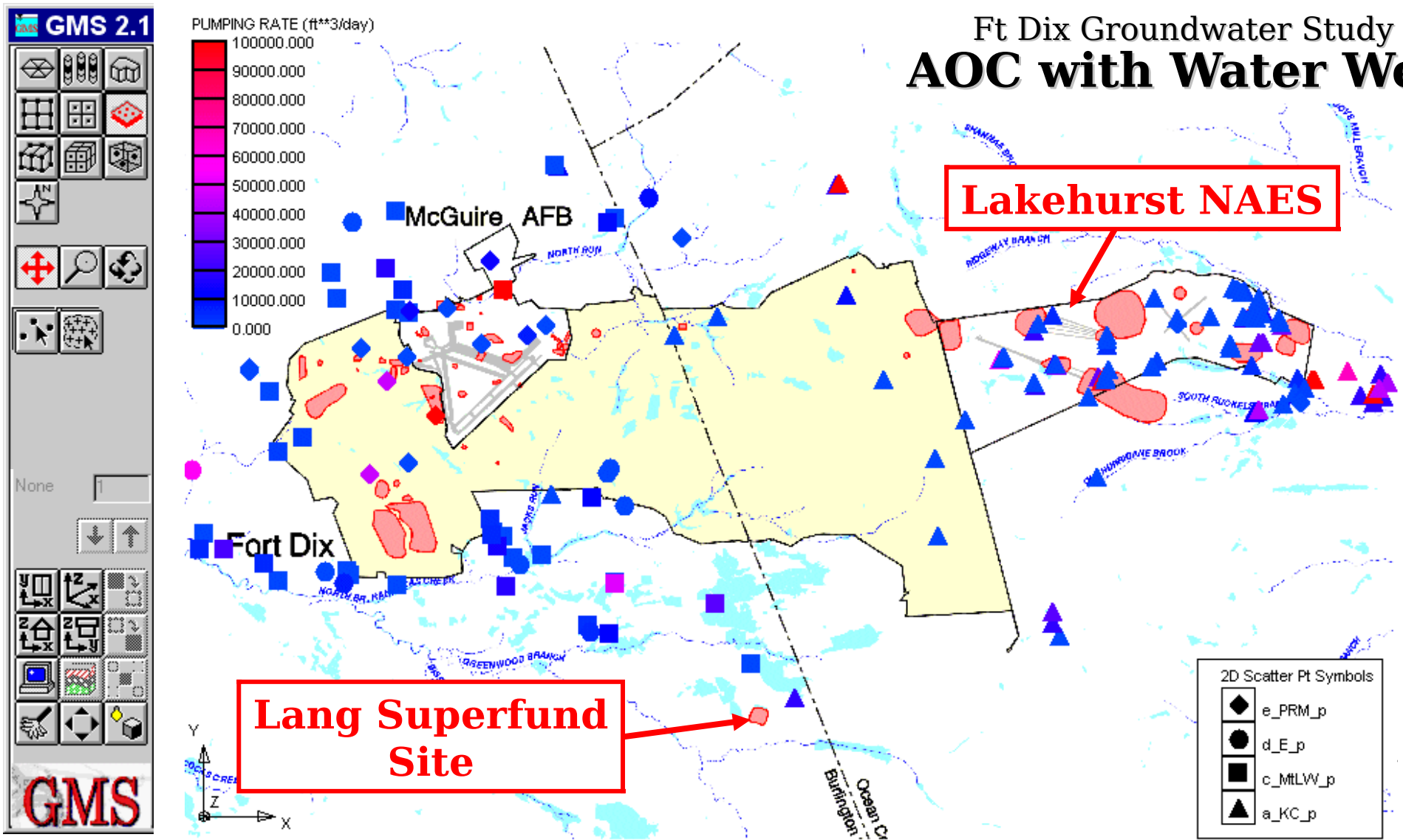






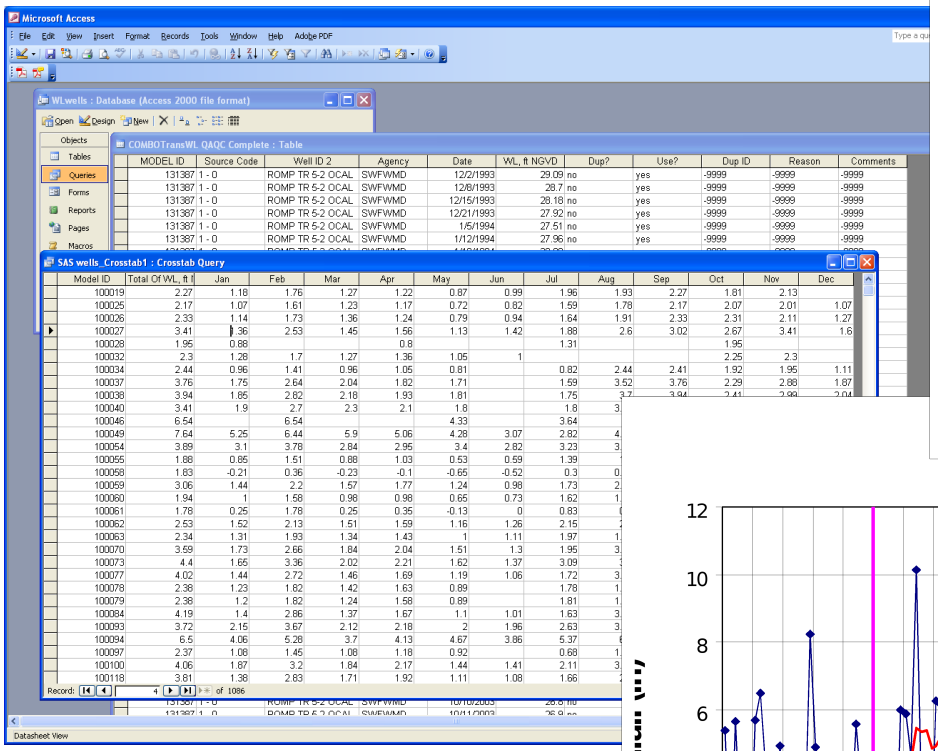
Problem Identification

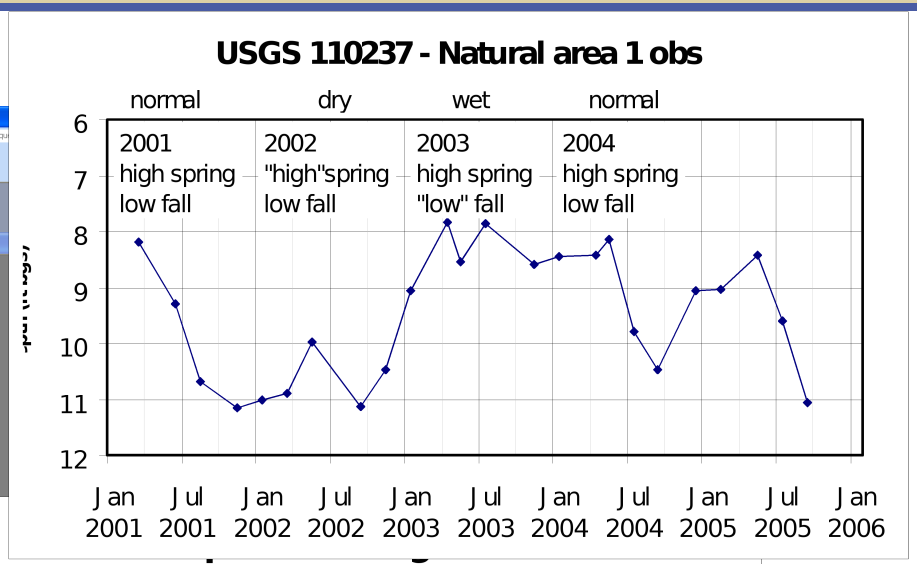
US Army Corps of Engineers
Philadelphia Distric

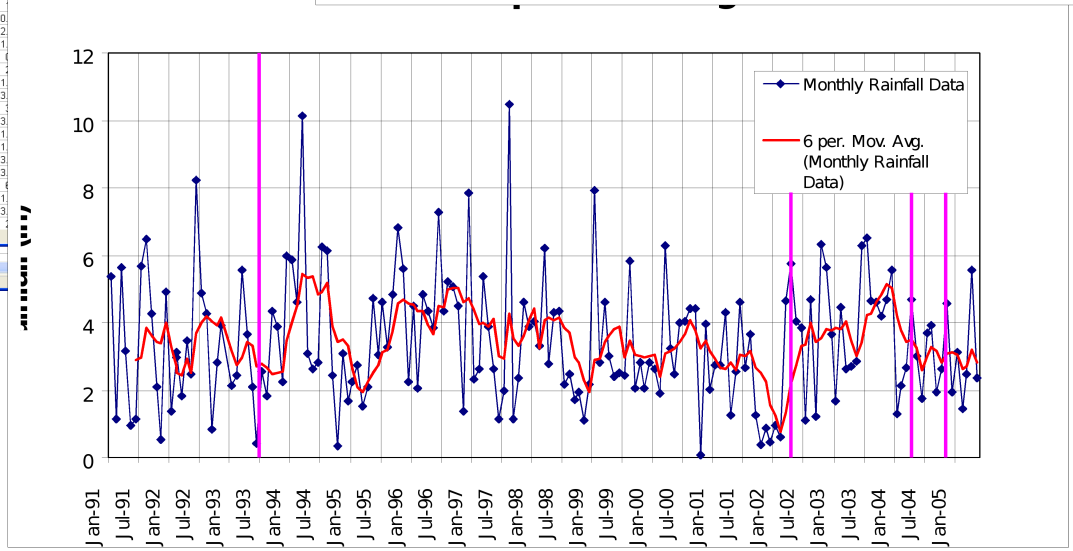


Data Collection and Processing

US Army Corps of Engineers
Philadelphia Distric


Microsoft Access
WLwells : Database (Access 2000 file format)
COMBOTransWL QAQC Complete : Table
SAS wells_Crosstab1 : Crosstab Query





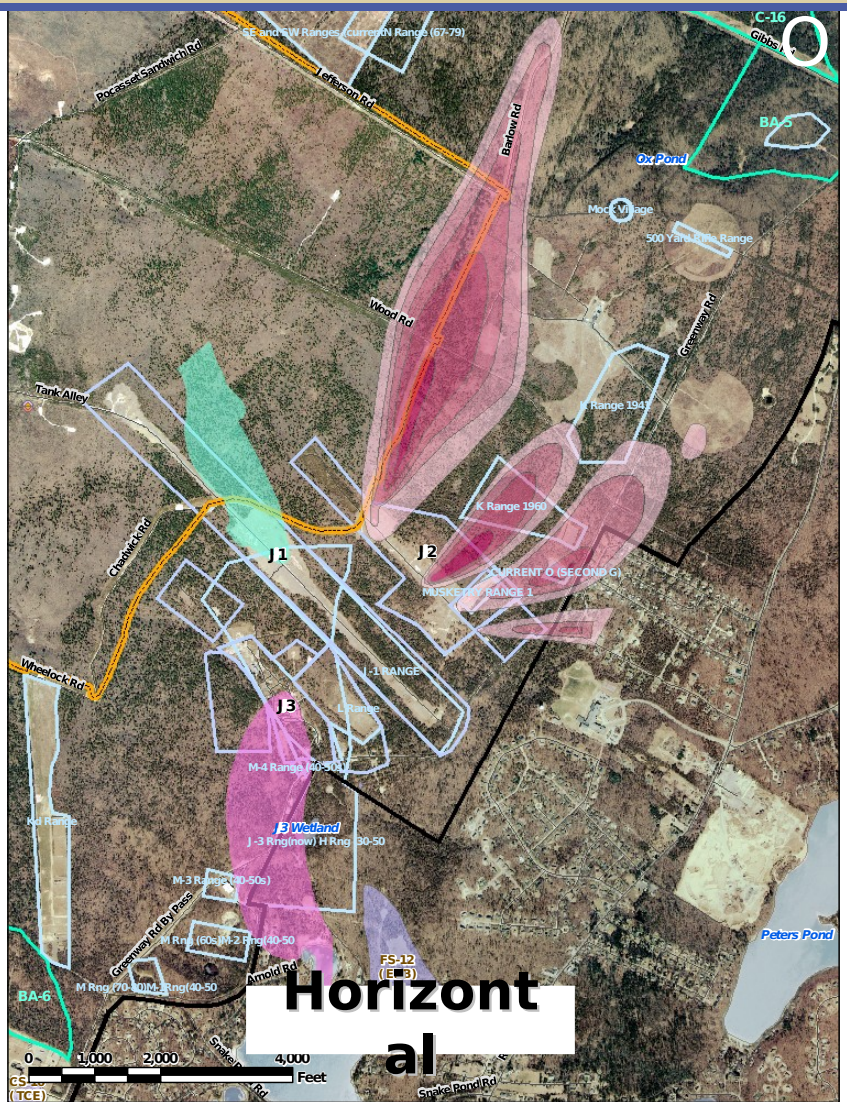
Data Needs

US Army Corps of Engineers
Philadelphia Distric

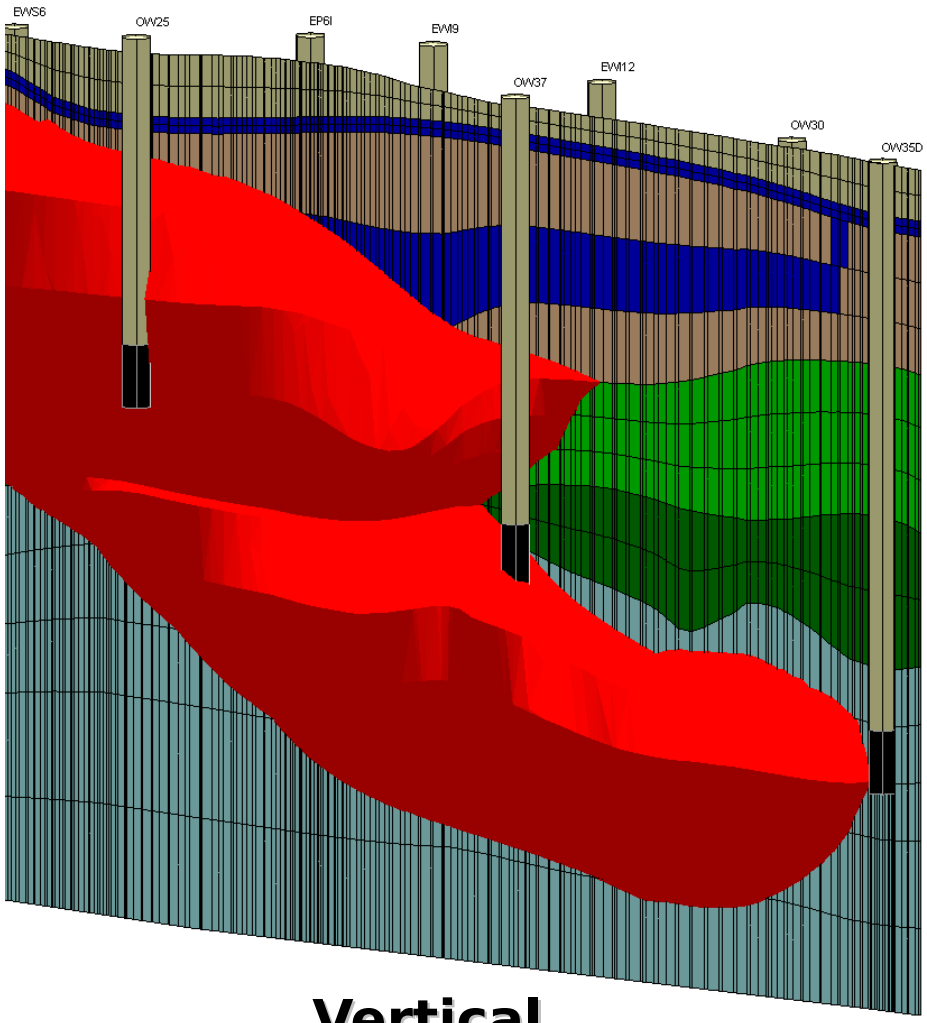
- Topographic
- Surface Water Elevations
- Geologic
- Hydrogeologic
  - Conductivities
  - Groundwater Total Heads
- Climate
  - Rainfall
  - Evapotranspiration
  - Recharge
- Pumping Information
- Irrigation information
- Steady State or Transient
- Contaminates
- Water Chemistry
- Density Flow
  - Salinity
  - NAPL

Data Visualization – Plume Plots

US Army Corps of Engineers
Philadelphia Distric



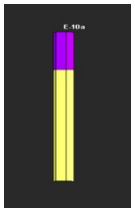
Horizontal



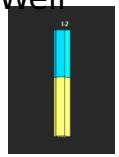
Vertical

Data Visualization – 3-D Site-wide

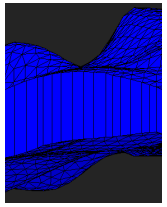
US Army Corps of Engineers
Philadelphia Distric



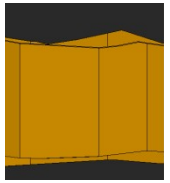
Extraction Well



Injection Well



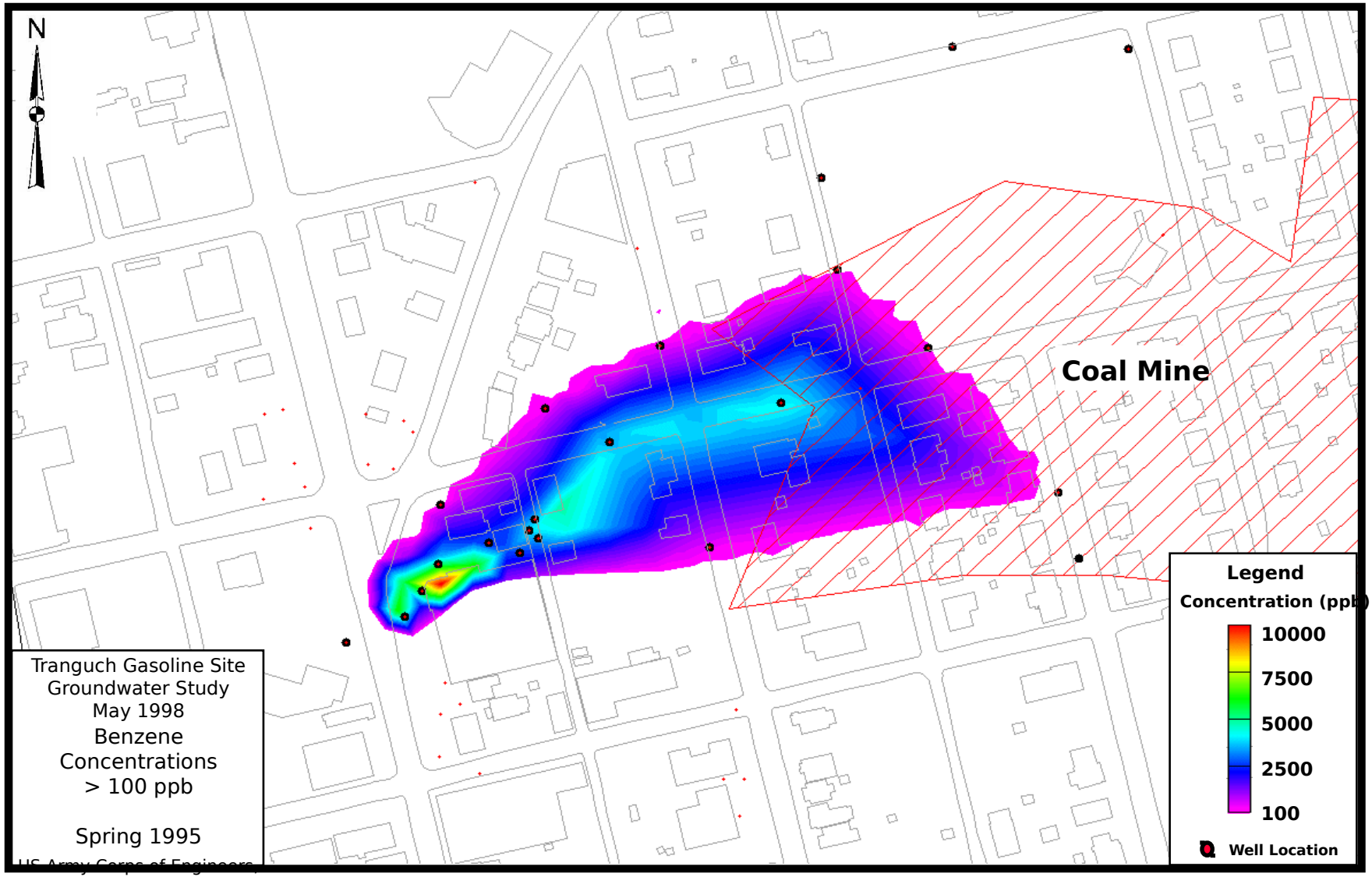
Trash



Slurry Wall

Data Visualization – Plume Plots

US Army Corps of Engineers
Philadelphia Distric



3-D Geologic Conceptualization

US Army Corps of Engineers
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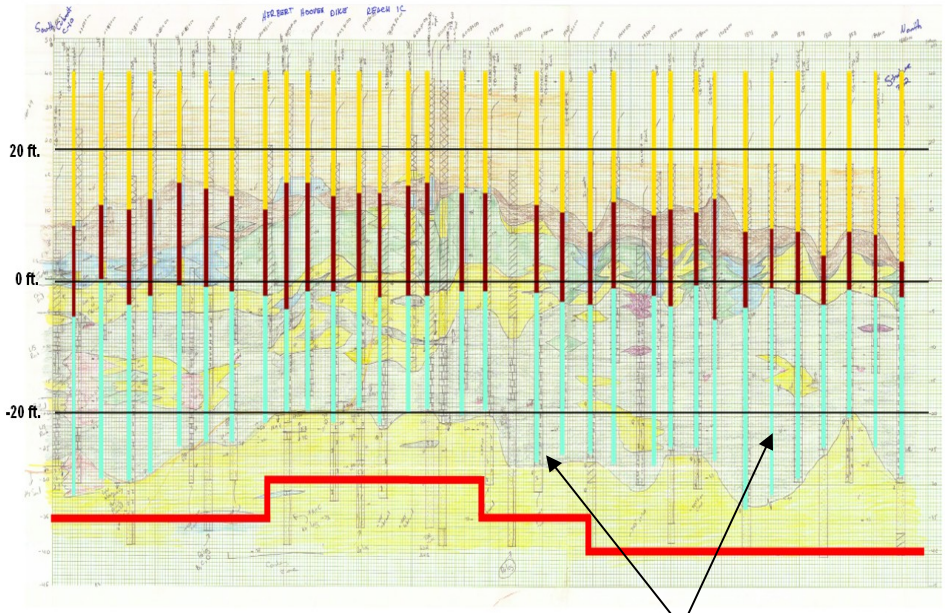
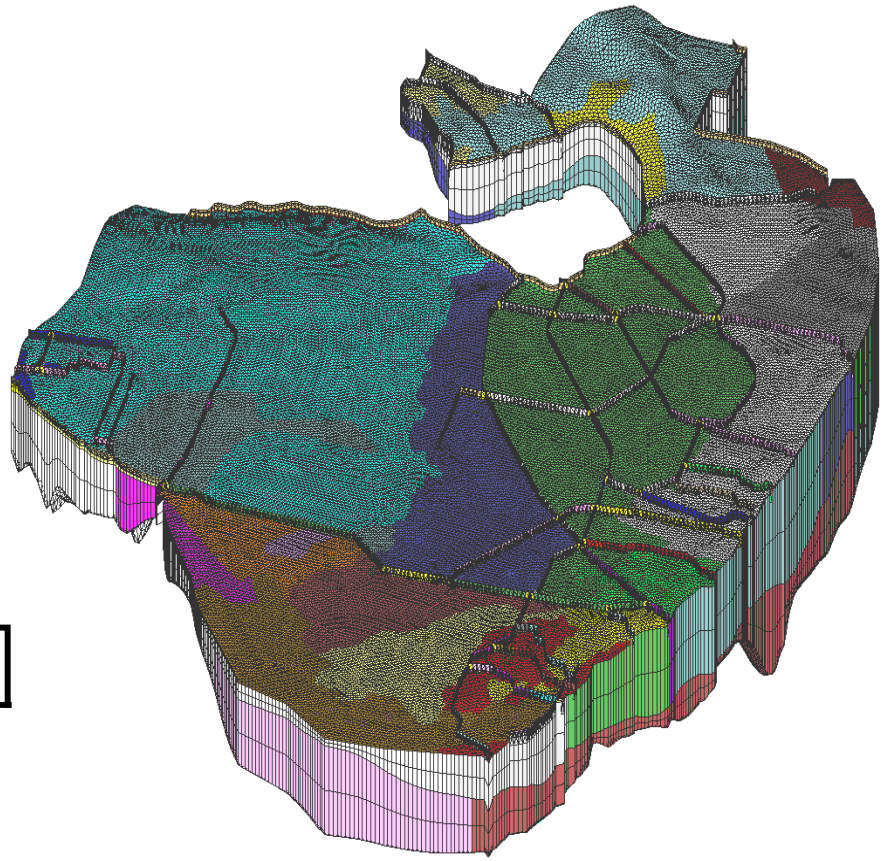


GMS Boreholes

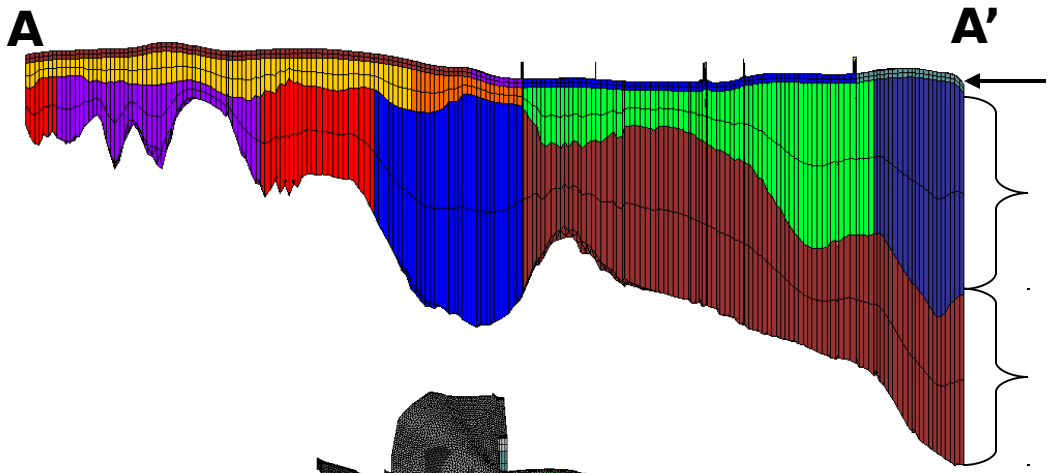
Borehole Materials

- **Layer 1 - undifferentiated**
- **Layer 2 - peat, clay, silt**
- **Layer 3A - limestone**



3-D Geologic Conceptualization

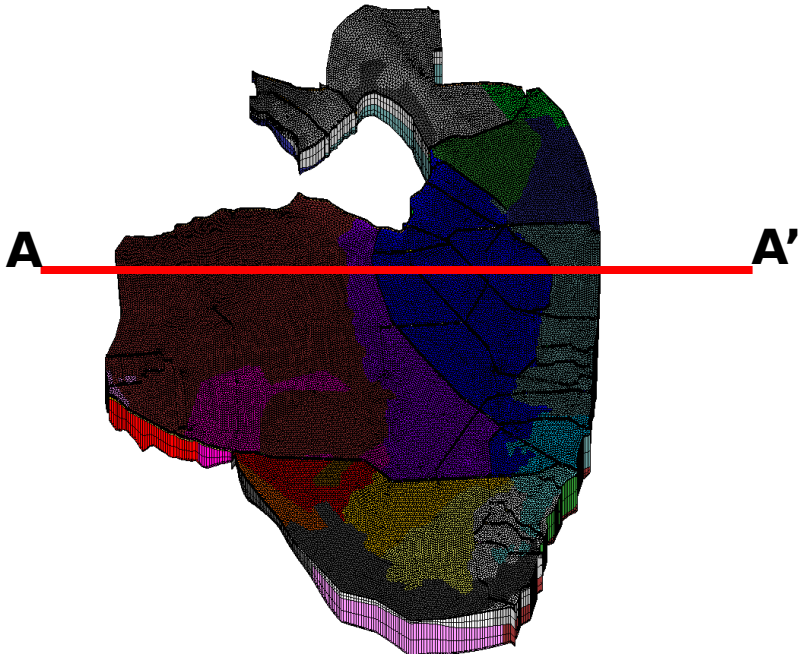
US Army Corps of Engineers
Philadelphia Distric



Surface Layer (2 vertical element

Middle Layer (2 vertical elements
Palm Beach/Biscayne Aquifer

Bottom Layer (2 vertical element
Tamiami/Gray Limestone/Ochopee



- The conceptual geology model was developed in 2005 by Jacksonville District based on Jacksonville District's South Florida Digital Elevation Model Report

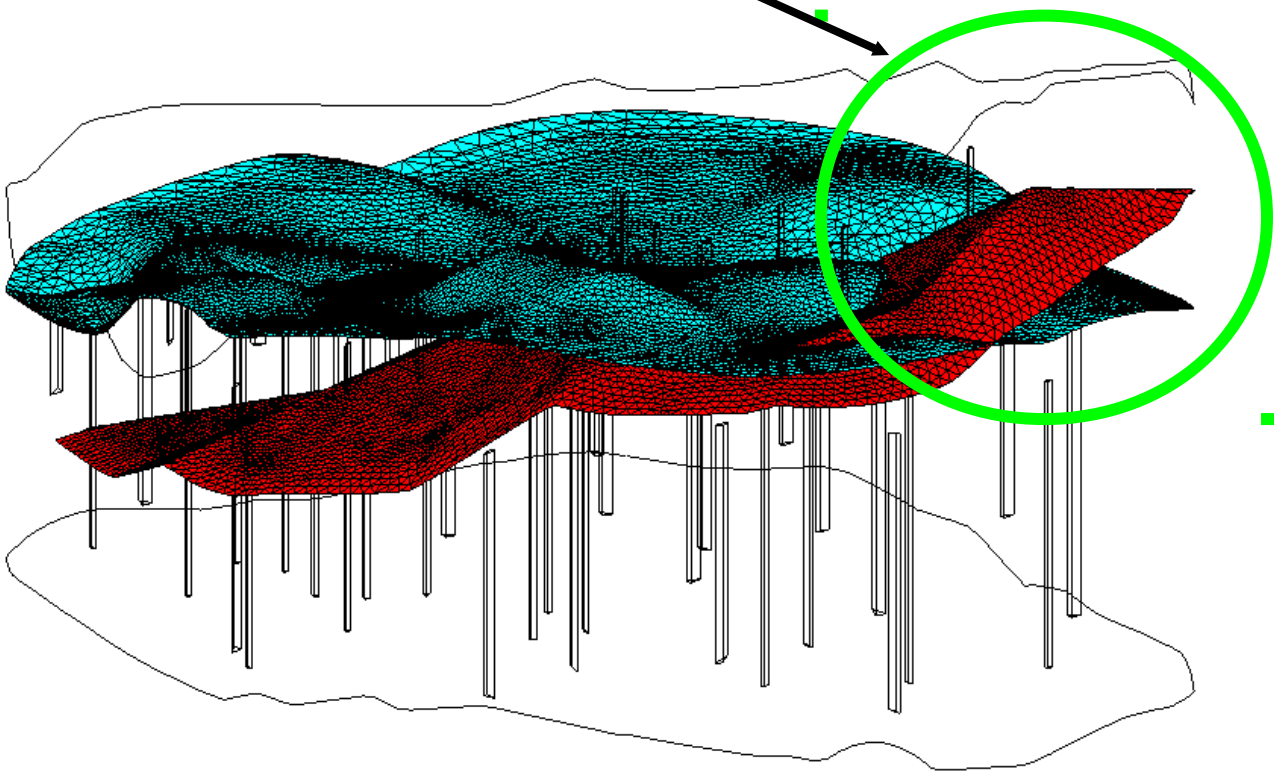
3-D Conceptual Models

US Army Corps of Engineers
Philadelphia Distric

Location of Unsaturated Trash

Legend

- **Slurry Wall Location**
- **Surface of Bad Trash**
- **Water Table Surface**

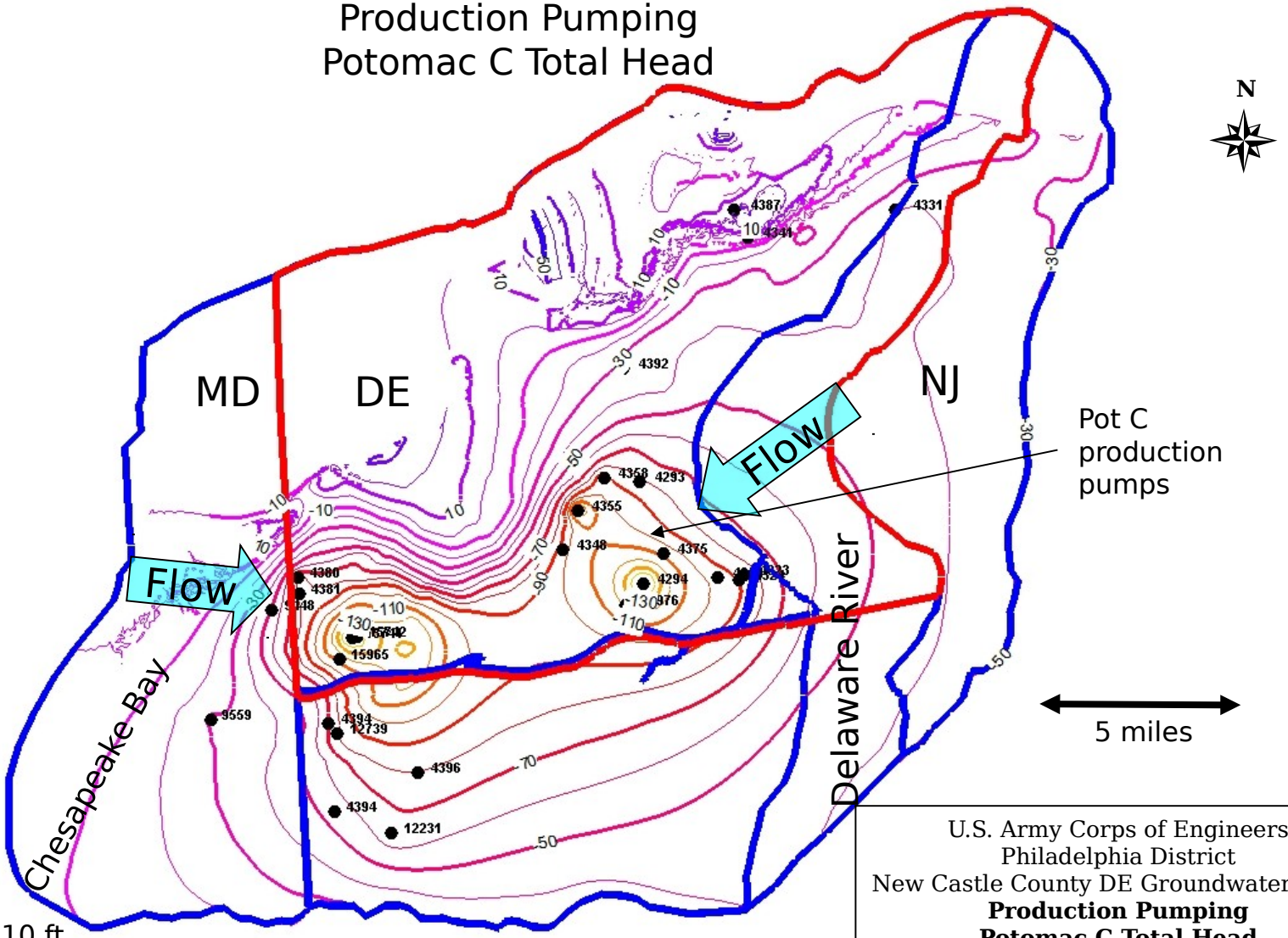


Lipari Superfund Site
Groundwater Study
2008

US Army Corps of Engineers,
Philadelphia District

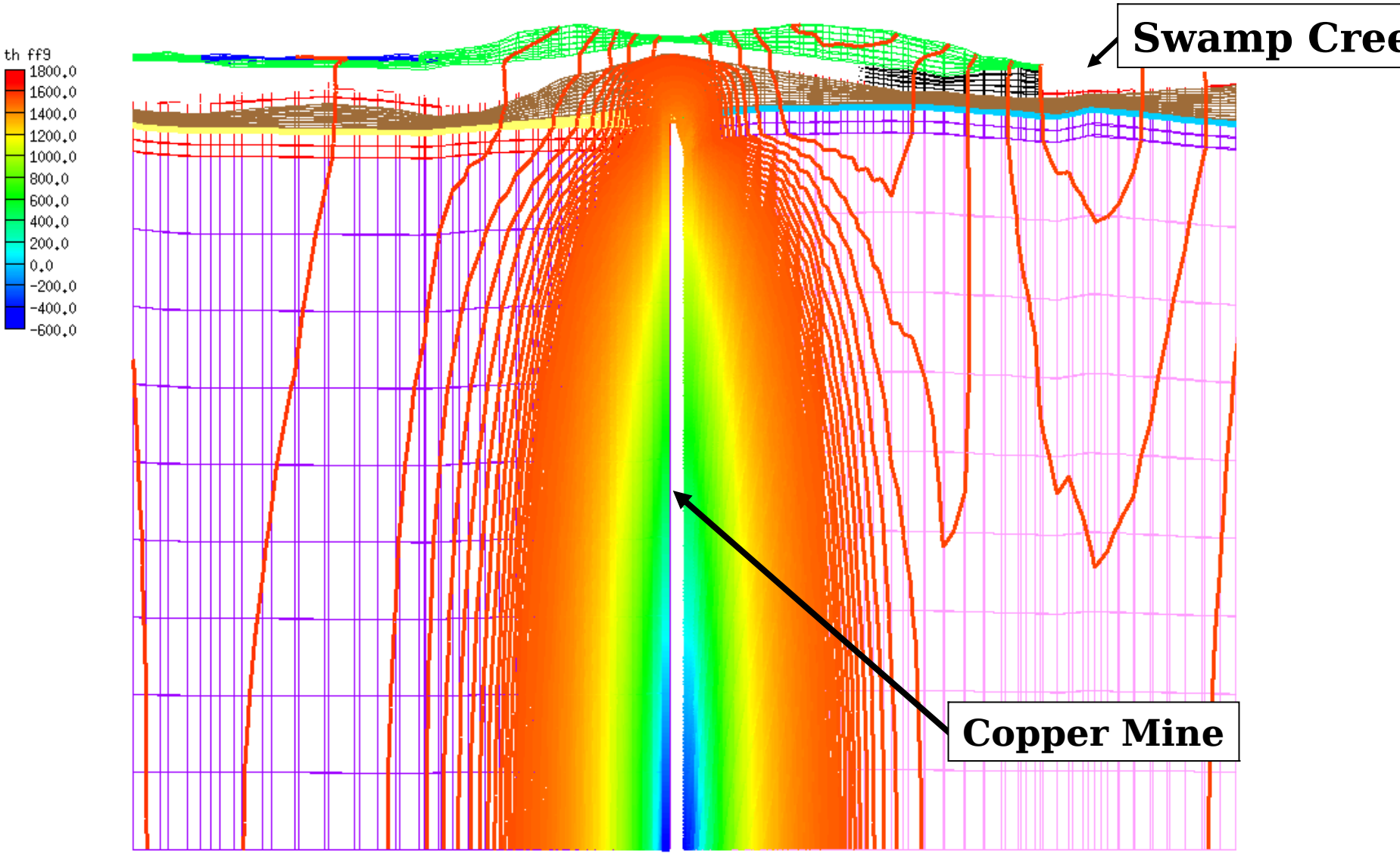
Flow Models – Water Supply

US Army Corps of Engineers
Philadelphia Distric



Flow Models – Wetlands Permits

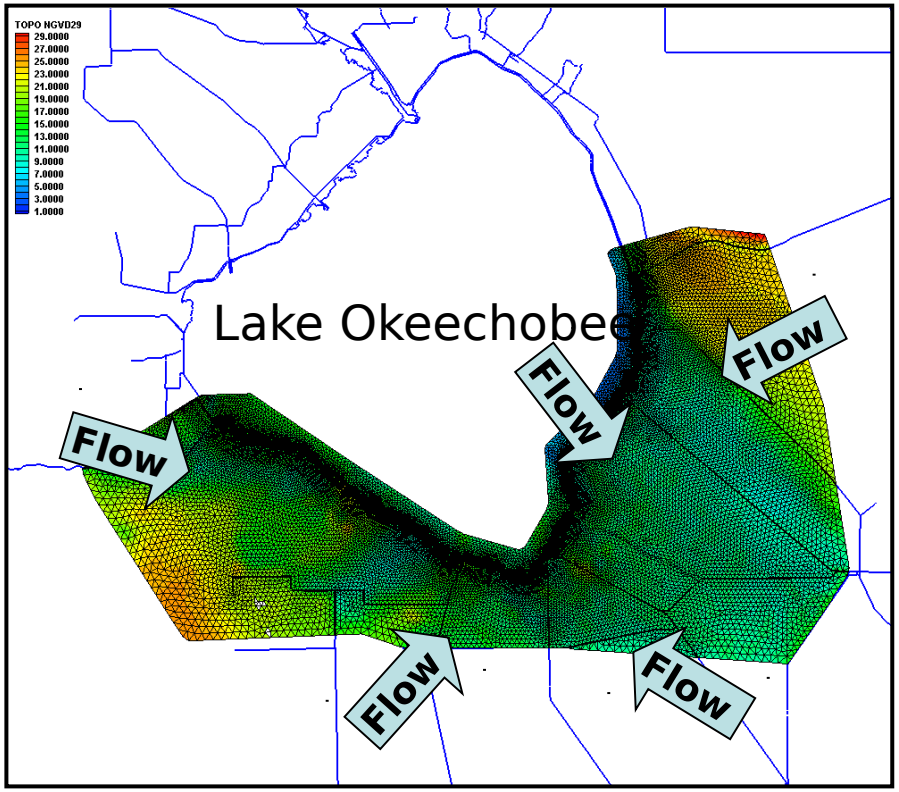
US Army Corps of Engineers
Philadelphia Distric

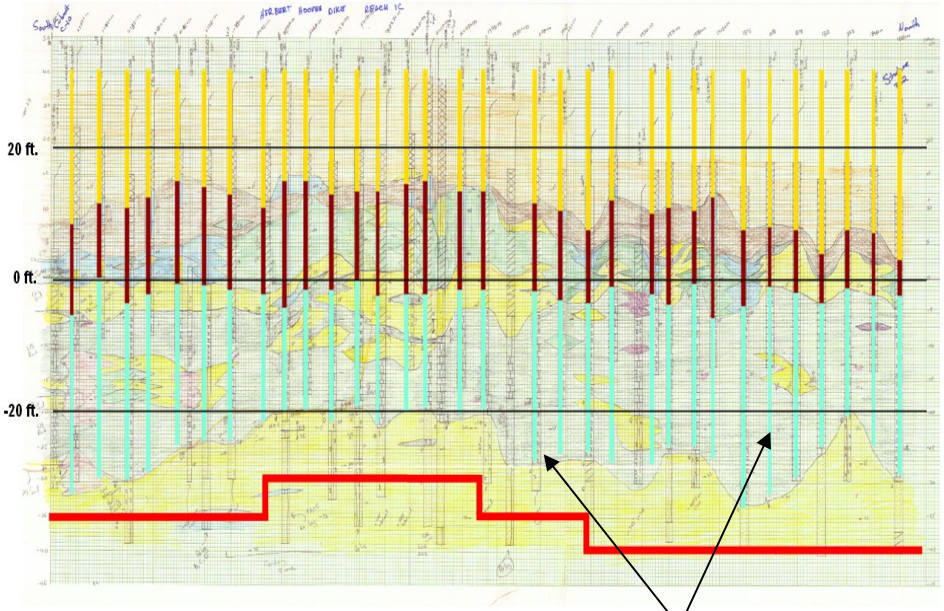


Flow Models – Design Analysis

US Army Corps of Engineers
Philadelphia Distric

Herbert Hoover Dike Regional Groundwater Flow Model





Borehole Materials

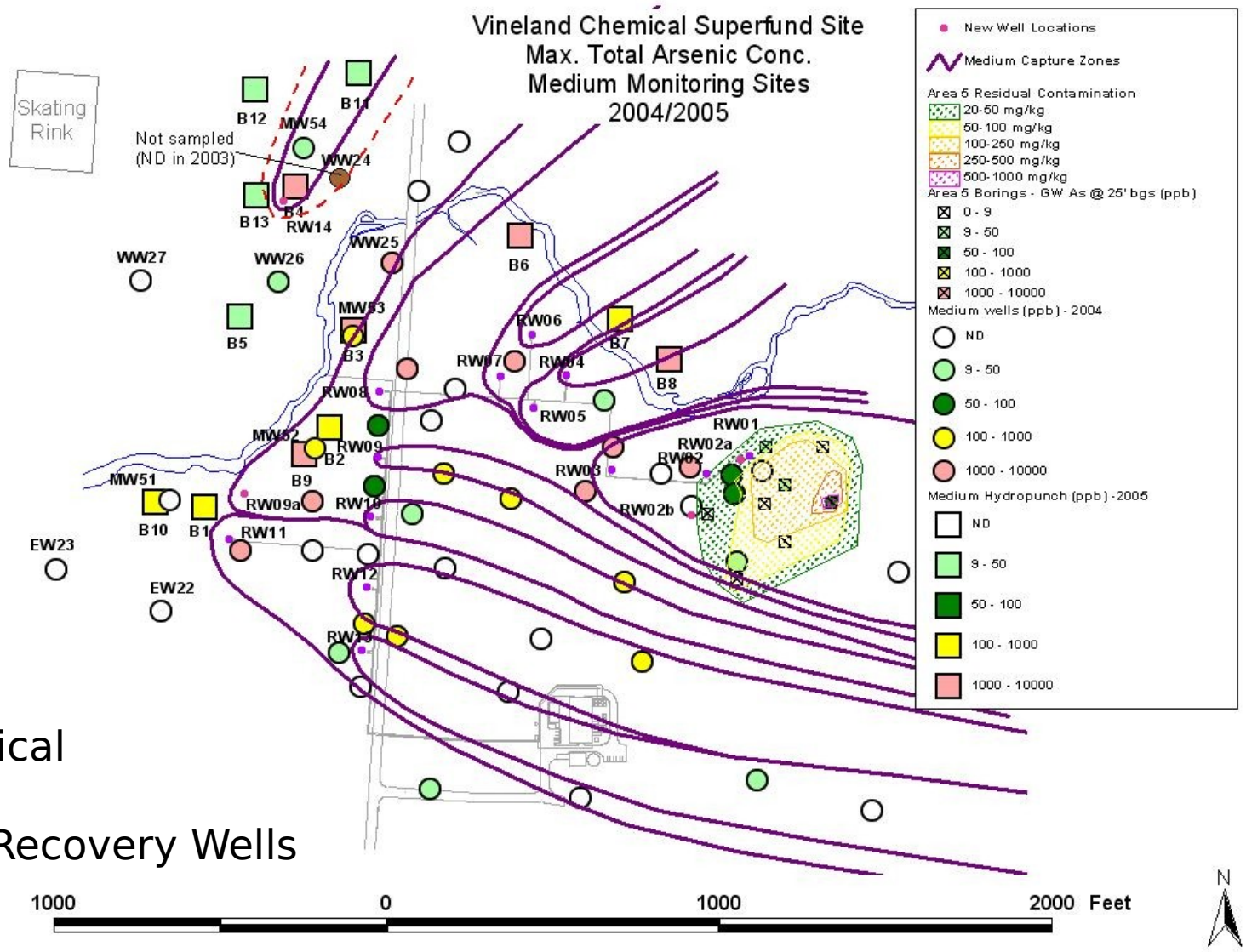
- **Layer 1 - undifferentiated**
- **Layer 2 - peat, clay, silt**
- **Layer 3A - limestone**

Proposed cut-of wall tip elevatio (based on 02 MAR 2007 design)

Flow Models – Capture Zone Analysis

US Army Corps of Engineers
Philadelphia Distric

Well	GPM
RW01	0
RW02	0
RW03	60
RW04	30
RW05	50
RW06	30
RW07	40
RW08	50
RW09	15
RW10	25
RW11	50
RW12	50
RW13	30
RW09a	50
RW02a	50
RW02b	80
RW14	50
Total	660



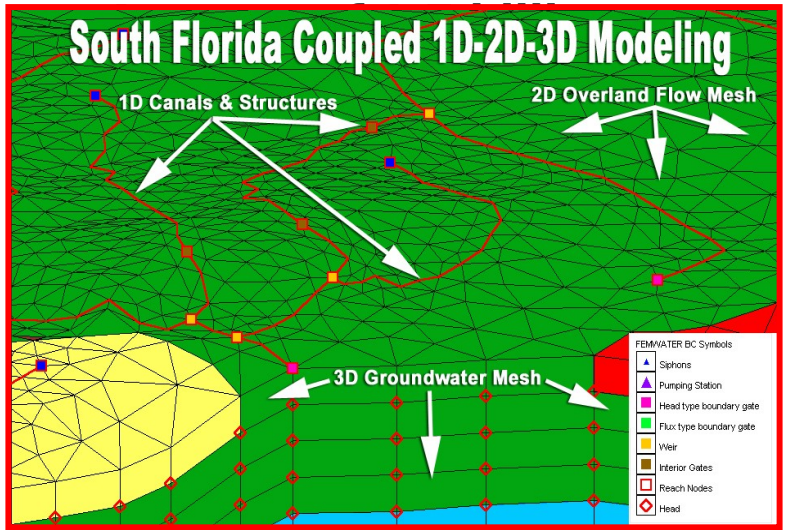
Vineland Chemical
Superfund Site
Proposed New Recovery Wells

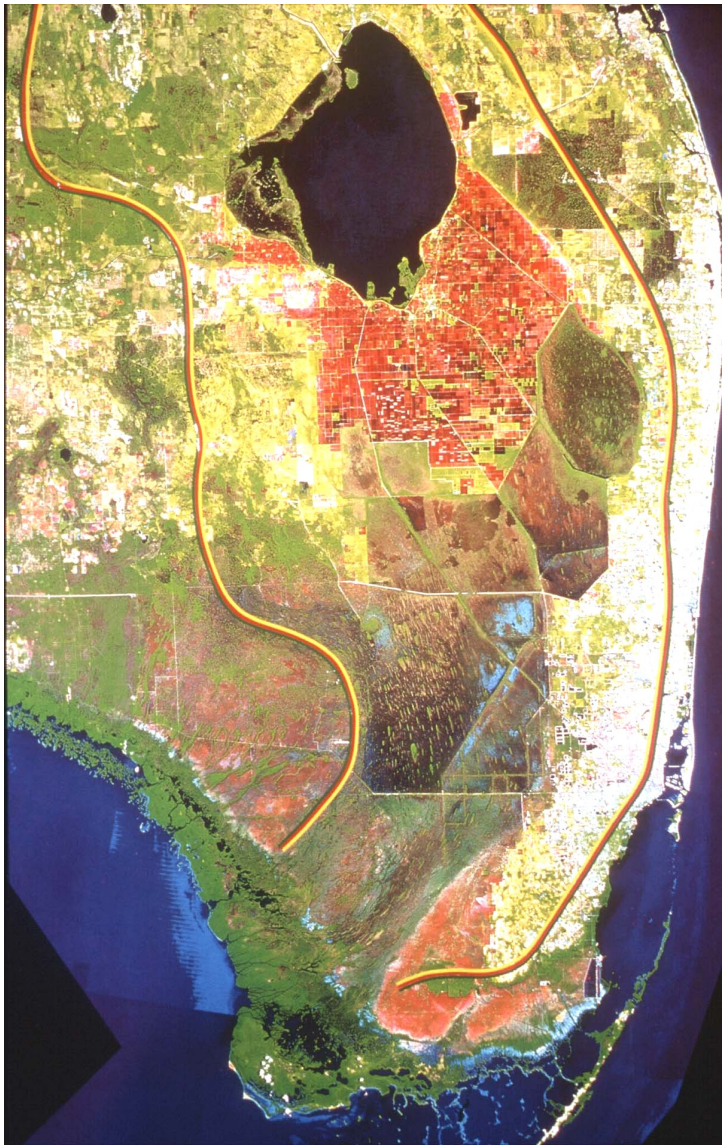
Flow Models – Surface/Subsurface Interaction

US Army Corps of Engineers
Philadelphia Distric

Everglades

- Too much/too little water for the Everglades/south Florida ecosystem
- Fragmentation of natural areas
- Degradation of water quality
- Population growth and increased demand

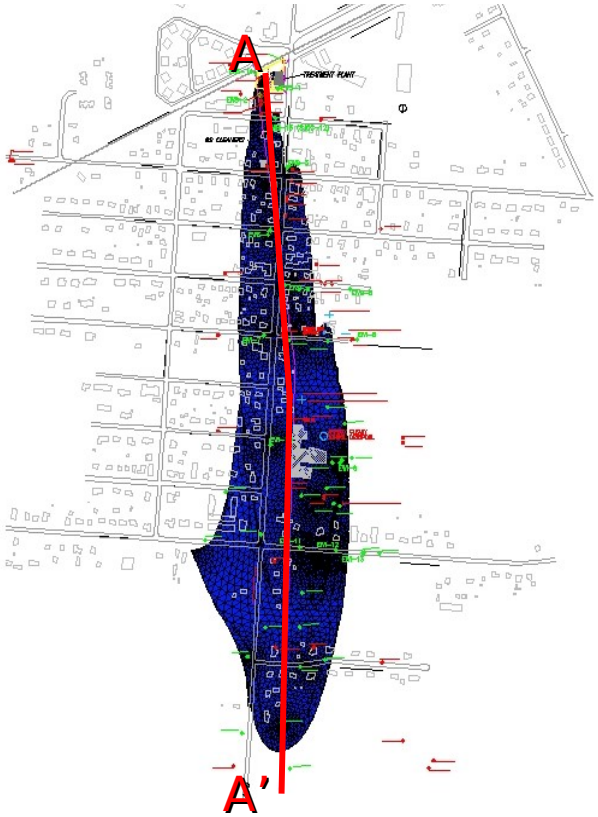


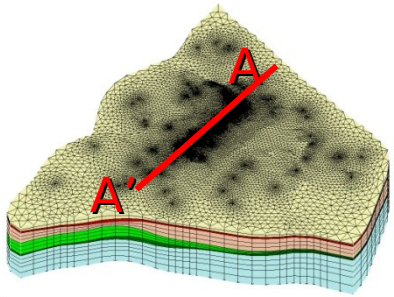


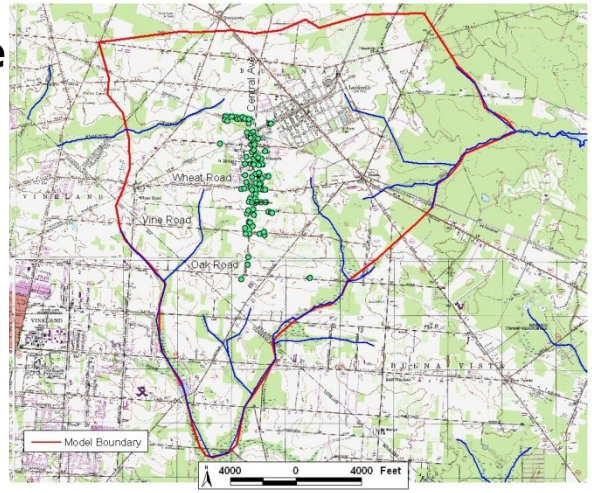
Contaminant Transport Modeling - Superfund

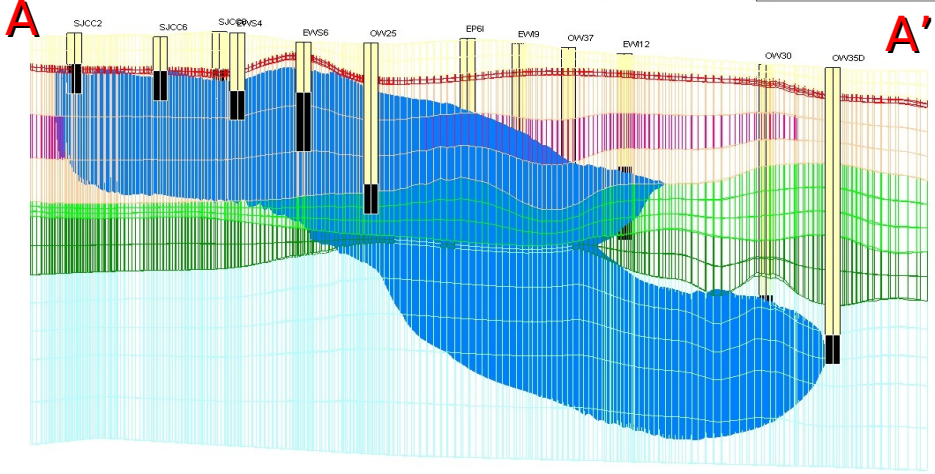
US Army Corps of Engineers
Philadelphia Distric

SJCC/GSC Superfund Site (NAP)









Upper Sand 1

Upper Sand 2

Banded Sand

Lower Clay

Lower Sand

Transport Run Resulting Plume – Cross Sectional View
July 1993 Flow Field, SJCC/GSC Superfund Site

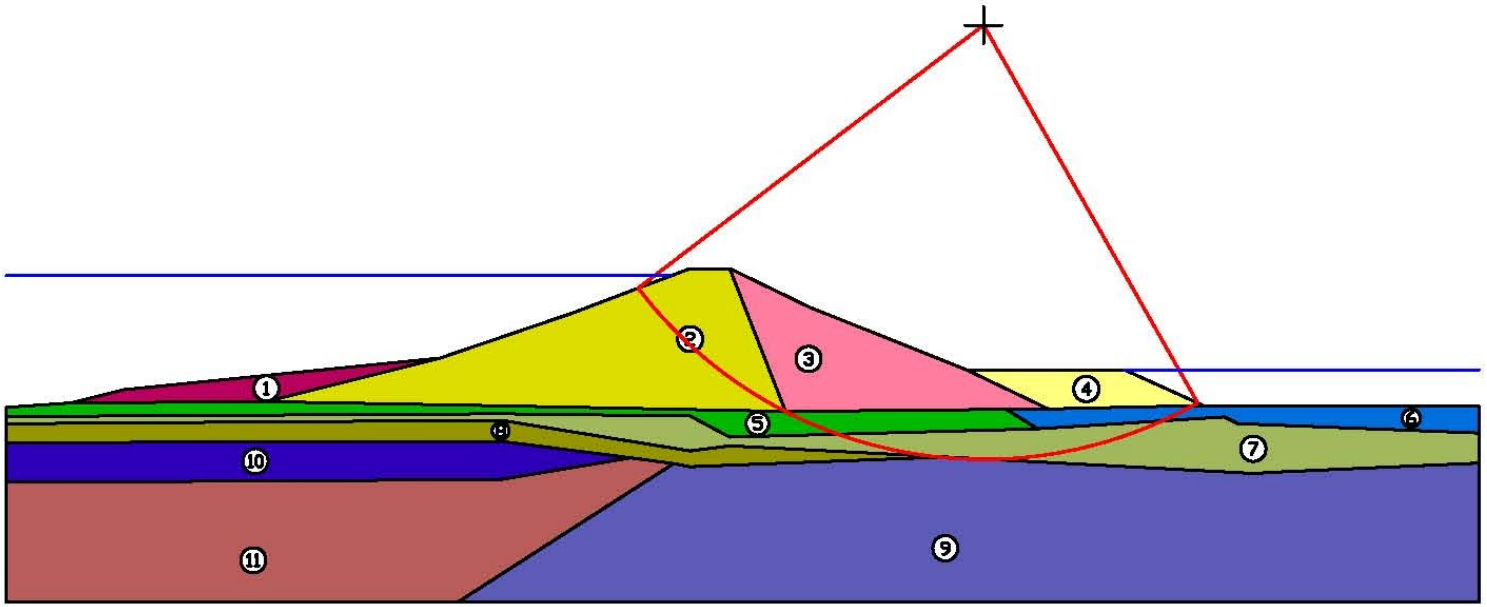
Dam Safety Analysis

US Army Corps of Engineers
Philadelphia Distric

JADWIN DAM
GLOBAL STABILITY ANALYSIS
CROSS SECTION 2
HIGH POOL, HIGH TAIL WATER, ANALYSIS A

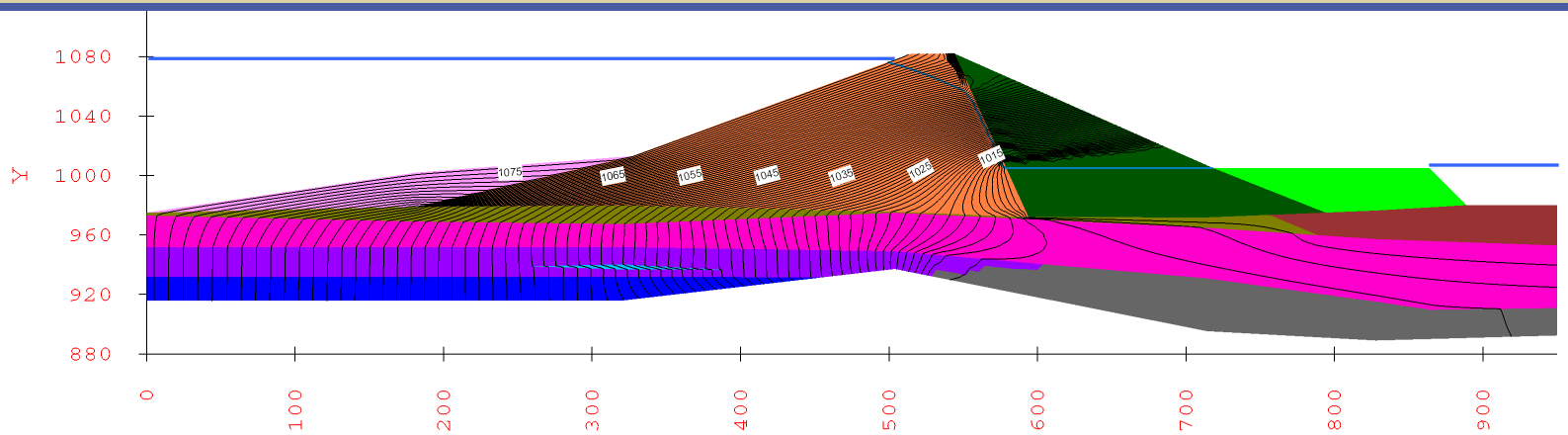
NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE	NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Earth Fill	120	Cohesion= 0.0 Friction angle= 37	Pore Pressure Interpolated	7	Sand	120	Cohesion= 2000.0 Friction angle= 13.3	Pore Pressure Interpolated
2	Earth Fill	128	Cohesion= 0.0 Friction angle= 37	Pore Pressure Interpolated	8	Gravel	120	Cohesion= 0.0 Friction angle= 36.8	Pore Pressure Interpolated
3	Rock Fill	122	Cohesion= 0.0 Friction angle= 45	Pore Pressure Interpolated	9	Gravel Boulders	130	Cohesion= 0.0 Friction angle= 36.8	Pore Pressure Interpolated
4	Rock Fill	122	Cohesion= 0.0 Friction angle= 45	Pore Pressure Interpolated	10	Silt	115	Cohesion= 500.0 Friction angle= 8	Pore Pressure Interpolated
5	Silty Sand	120	Cohesion= 2000.0 Friction angle= 13.3	Pore Pressure Interpolated	11	Sand Gravel	120	Cohesion= 2000.0 Friction angle= 13.3	Pore Pressure Interpolated
6	Sand and Gravel	120	Cohesion= 0.0 Friction angle= 36.8	Pore Pressure Interpolated					

Factor of safety= 2.130
Side force inclination= -10.46 degrees



Dam Safety Analysis

US Army Corps of Engineers
Philadelphia Distric



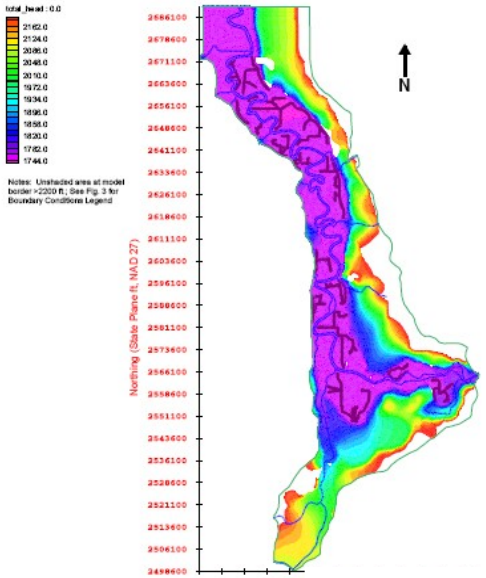
Design Flood
STA 10+25
High Tailwater
Conductivity Values – Set A

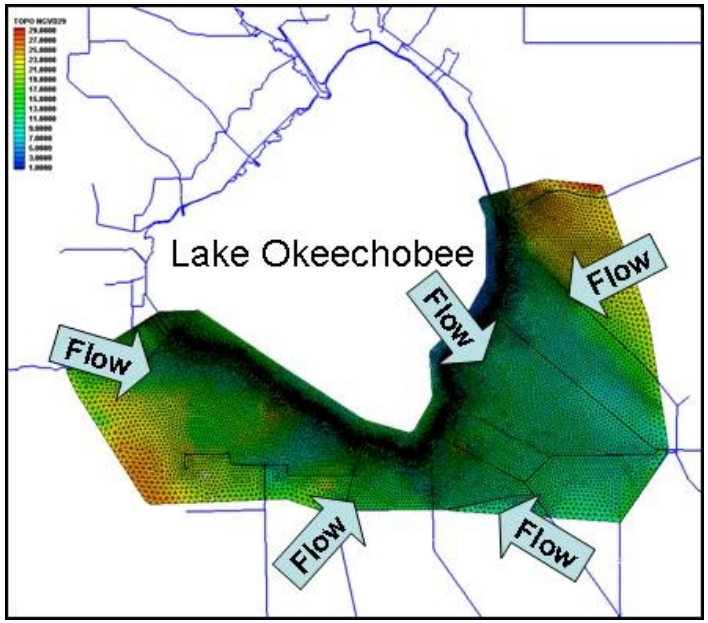
Material	Horizontal Hydraulic Conductivity (ft/d)	Vertical Hydraulic Conductivity (ft/d)
Uncompacted Earth Fill	0.05	0.005
Compacted Earth Fill	0.01	0.001
Dumped Rock Fill	1000	100
Dumped Rock Fill	300	30
Silty Sand	0.05	0.005
Sand and Gravel	10	1.0
Silty Sand	0.4	0.04
Sandy Gravel	1.8	0.9
Sand Gravel Boulders	100	5.0
Silt	0.005	0.0005
Silty Sand Gravel	0.5	0.05

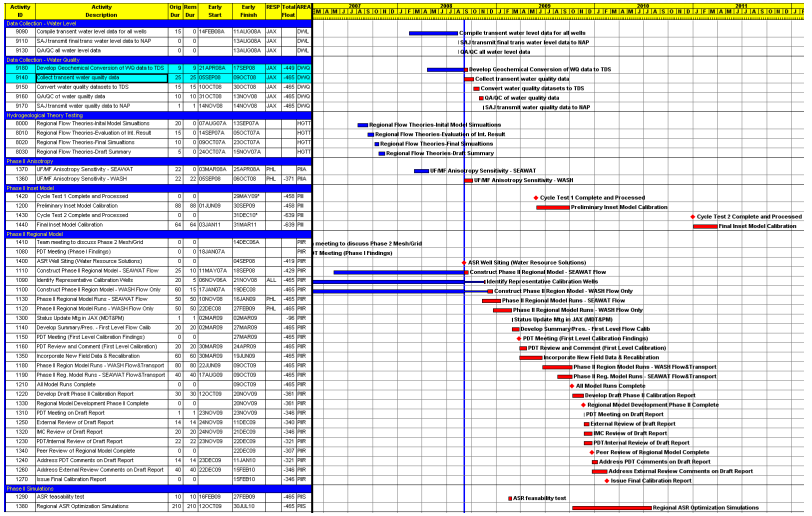
Services for A/E Contracts

US Army Corps of Engineers
Philadelphia Distric

- **SOW - Write or Review**
- **Prepare Gov. Estimates and Schedules**
- **ITR Contractor Products**



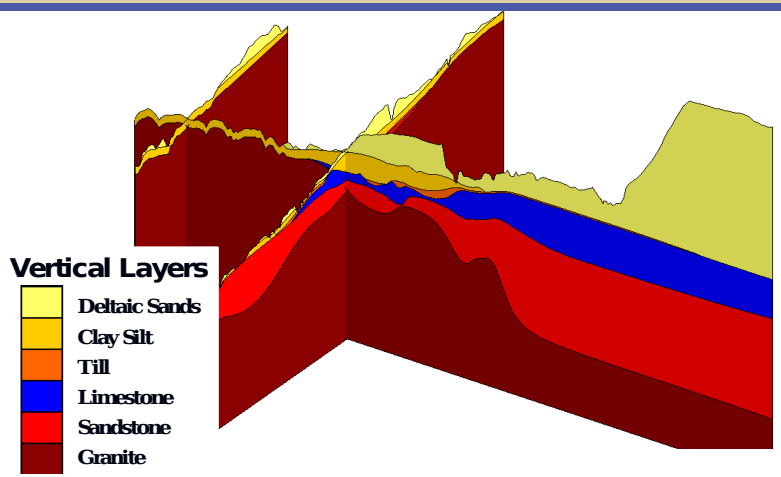


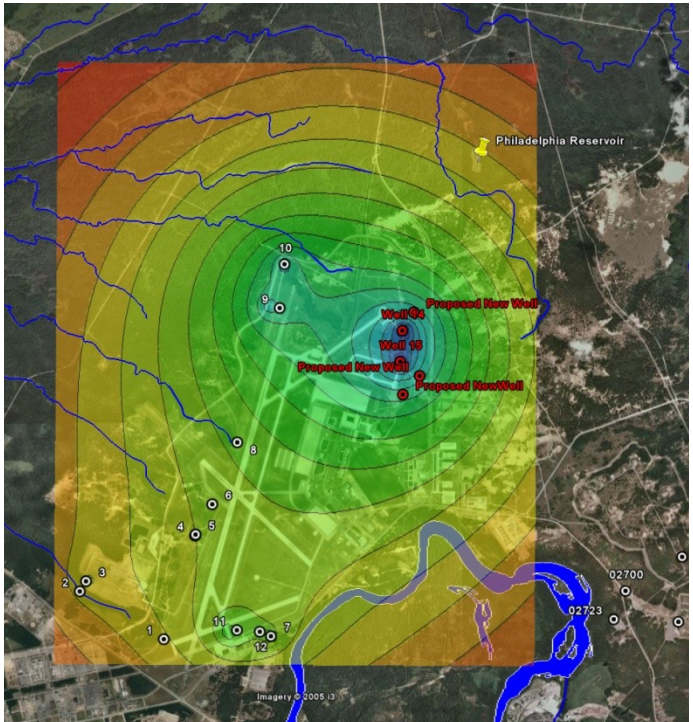

Activity ID
Activity Description
Orig Dur
Rem Dur
Early Start
Early Finish
RESP
Total Float
AREA
2001
2002
2003
2004
2005
2006
2007
Data Collection - Water Level
Data Collection - Water Quality
Hydrogeological Theory Testing
Phase II Analysis
Phase II Model
Phase II Regional Model
Aquifer Simulations
Compile transient water level data for all wells
SAJ transmit final trans water level data to NAP
GA/QC all water level data
Develop Geochemical Conversion of WQ data to TDS
Collect transient water quality data
Convert water quality datasets to TDS
GA/QC of water quality data
SAJ transmit water quality data to NAP
Regional Flow Theories-Initial Model Simulations
Regional Flow Theories-Evaluation of Int. Result
Regional Flow Theories-Final Simulations
Regional Flow Theories-Draft Summary
UFMF Anisotropy Sensitivity - SEAWAT
UFMF Anisotropy Sensitivity - WASH
Cycle Test 1 Complete and Processed
Preliminary Inset Model Calibration
Cycle Test 2 Complete and Processed
Final Inset Model Calibration
ASR Well Siting (Water Resource Solutions)
Construct Phase II Regional Model - SEAWAT Flow
Identify Representative Calibration Wells
Construct Phase II Region Model - WASH Flow Only
Phase II Regional Model Runs - SEAWAT Flow
Phase II Regional Model Runs - WASH Flow Only
Status Update Mtg in JAX (MET&PM)
Develop Summary/Pres. - First Level Flow Calib
PDT Meeting (First Level Calibration Findings)
PDT Review and Comment (First Level Calibration)
Incorporate New Field Data & Recalibration
Phase II Region Model Runs - WASH Flow&Transport
Phase II Reg. Model Runs - SEAWAT Flow&Transport
All Model Runs Complete
Develop Draft Phase II Calibration Report
Regional Model Development Phase II Complete
PDT Meeting on Draft Report
External Review of Draft Report
MC Review of Draft Report
PDT Internal Review of Draft Report
Peer Review of Regional Model Complete
Address PDT Comments on Draft Report
Address External Review Comments on Draft Report
Issue Final Calibration Report
ASR feasability test
Regional ASR Optimization Simulations

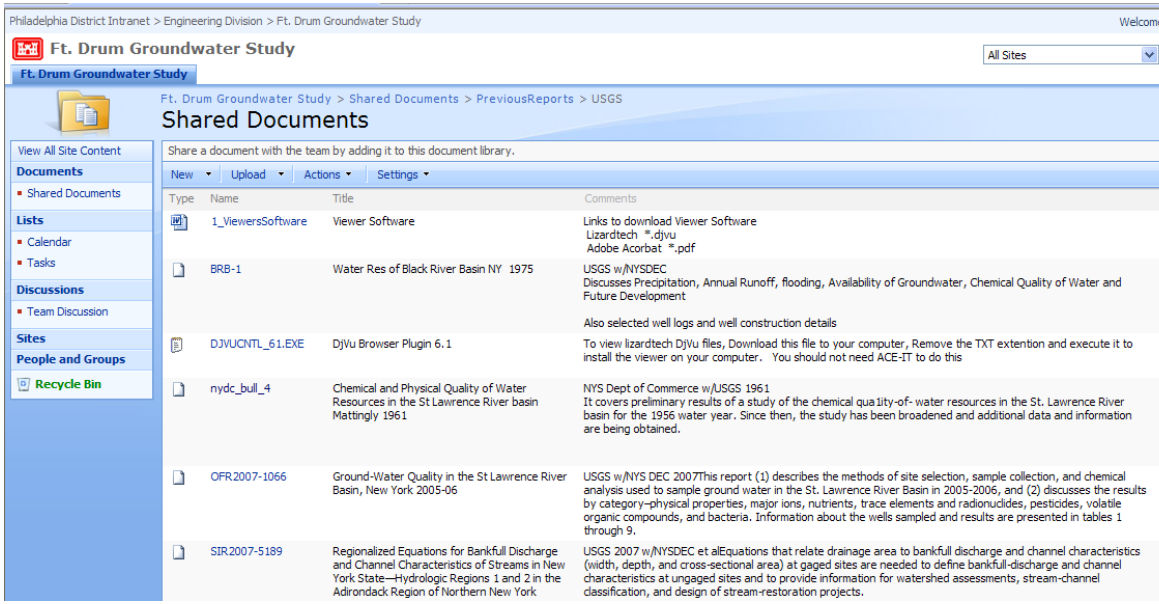
Ft Drum Case Study

US Army Corps of Engineers
Philadelphia Distric

- Collect Available Data
- Construct Conceptual Model
- Identify Data Gaps
- Draft Data Collection SOW






Philadelphia District Intranet > Engineering Division > Ft. Drum Groundwater Study
Ft. Drum Groundwater Study
Ft. Drum Groundwater Study
All Sites
Ft. Drum Groundwater Study > Shared Documents > PreviousReports > USGS
Shared Documents
View All Site Content
Documents
Shared Documents
Lists
Calendar
Tasks
Discussions
Team Discussion
Sites
People and Groups
Recycle Bin
Share a document with the team by adding it to this document library.
New
Upload
Actions
Settings
Type
Name
Title
Comments
1_ViewersSoftware
Viewer Software
Links to download Viewer Software
Lizardtech *.djvu
Adobe Acorbat *.pdf
BRB-1
Water Res of Black River Basin NY 1975
USGS w/NYSDEC
Discusses Precipitation, Annual Runoff, flooding, Availability of Groundwater, Chemical Quality of Water and Future Development
Also selected well logs and well construction details
DJVUCNTL_61.EXE
DjVu Browser Plugin 6.1
To view lizardtech DjVu files, Download this file to your computer, Remove the TXT extention and execute it to install the viewer on your computer. You should not need ACE-IT to do this
nydc_bull_4
Chemical and Physical Quality of Water Resources in the St Lawrence River basin Mattingly 1961
NYS Dept of Commerce w/USGS 1961
It covers preliminary results of a study of the chemical qua1ity-of- water resources in the St. Lawrence River basin for the 1956 water year. Since then, the study has been broadened and additional data and information are being obtained.
OFR2007-1066
Ground-Water Quality in the St Lawrence River Basin, New York 2005-06
USGS w/NYS DEC 2007This report (1) describes the methods of site selection, sample collection, and chemical analysis used to sample ground water in the St. Lawrence River Basin in 2005-2006, and (2) discusses the results by category–physical properties, major ions, nutrients, trace elements and radionuclides, pesticides, volatile organic compounds, and bacteria. Information about the wells sampled and results are presented in tables 1 through 9.
SIR2007-5189
Regionalized Equations for Bankfull Discharge and Channel Characteristics of Streams in New York State—Hydrologic Regions 1 and 2 in the Adirondack Region of Northern New York
USGS 2007 w/NYSDEC et alEquations that relate drainage area to bankfull discharge and channel characteristics (width, depth, and cross-sectional area) at gaged sites are needed to define bankfull-discharge and channel characteristics at ungaged sites and to provide information for watershed assessments, stream-channel classification, and design of stream-restoration projects.

Modeling on the Cutting Edge of Technology

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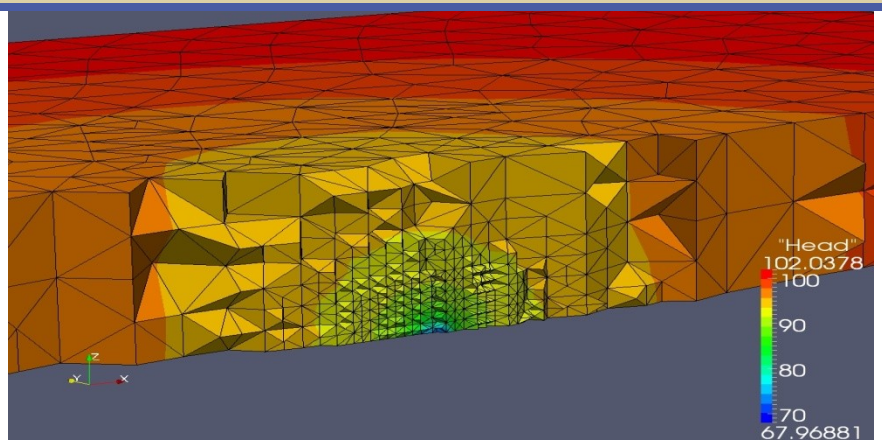
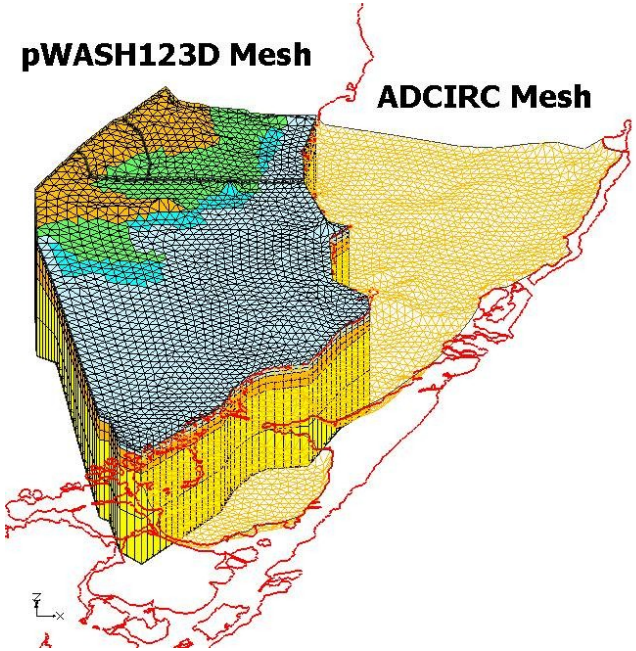
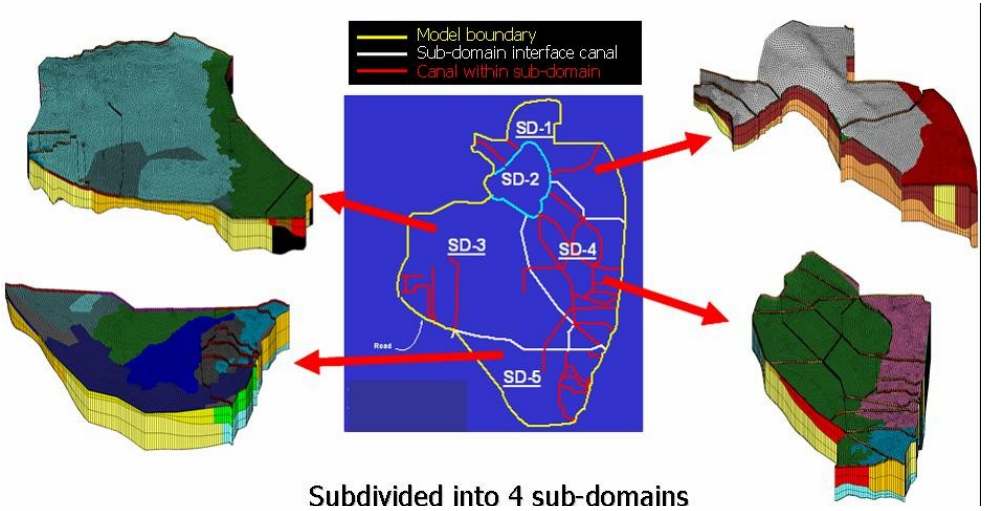


ADH

System-Wide Water
SWWRP
Resources Program





Subdivided into 4 sub-domains

Internal Technical Reviews (ITR)

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Kootenia River ITR for NWS

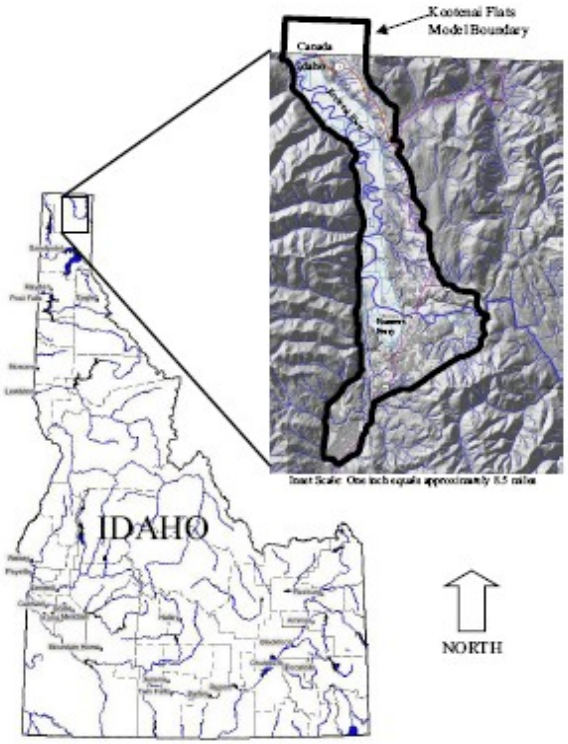

Figure 1. Site Map